

REMARKS/ARGUMENTS

Initially, Applicants would like to express their appreciation to the Examiner for the acknowledgement that the drawings are acceptable.

In the Final Official Action, Claims 1-2 and 5-6 were rejected under 35 U.S.C. §103(a) over MASAKAZU (JP Hei 10-090300) in view of KEICHI et al (JP Hei 6-340452). Claims 3-4, 7-8 and 10-11 were rejected under 35 U.S.C. §103(a) over MASAKAZU in view of KEICHI, and further in view of KATSUMI (JP Hei 9-196700). Claim 9 was rejected under 35 U.S.C. §103(a) over MASAKAZU in view of KEICHI, and further in view of KATSUMI.

Pursuant to M.P.E.P. §714.13, Applicants contend that entry of the present amendment is appropriate because the proposed amended claims avoid the rejections set forth in the last Office Action, resulting in the application being placed in condition for allowance, or alternatively, the revised claims place the application in better condition for purposes of appeal. Furthermore, the revised claims do not present any new issues that would require any further consideration or search by the Examiner, and the amendment does not present any additional claims without cancelling a like number of pending claims. Accordingly, entry of the present amendment is respectfully requested.

Upon entry of the amendment, claims 1, 4-5, and 8-9 have been amended. Claims 2-3, 6-7, and 10-11 have been cancelled. Thus, claims 1, 4-5, and 8-9 are currently pending for consideration by the Examiner.

Claims 1-2 and 5-6 were rejected under 35 U.S.C. §103(a) over MASAKAZU (JP Hei 10-090300) in view of KEICHI et al (JP Hei 6-340452). Amended independent method claims 1 and 5 have each been amended to recite that all of the fixed electrode, the movable electrode, the bonding face-side surfaces of the insulating substrate and the semiconductor substrate, and the

equipotential wiring are placed inside the sensor bonding area. Amended claims 1 and 5 also recite that the equipotential wiring is cut by laser irradiation allowed to pass through from the insulating substrate.

The recited features are required in order to prevent discharge in anodic bonding, and to reduce resistance of the equipotential wiring. The recited features also create air tightness inside the peripheral bonding areas of the insulating substrate and the semiconductor substrate, resulting in a closed or sealed sensor. This feature prevents the intrusion of moisture into the sensor, which in turn may change the electrostatic capacitance of the sensor, thereby reducing the long term stability of the characteristics of the sensor.

Applicants submit that the above recited features of claims 1 and 5 are not disclosed, taught, or suggested by the combination of MASAKAZU and KEICHI for several reasons. For instance, Applicants submit that MASAKAZU fails to disclose the forming of an equipotential wiring to short-circuit a fixed electrode to a movable electrode, as claimed. In this regard, the Examiner's attention is drawn to the amendment to the specification contained herein, which deletes reference to MASAKAZU (JP Hei 10-090300) on Applicants' specification page 3, lines 2-3. This reference to MASAKAZU (JP Hei 10-090300) was an error made during the drafting of the English language specification, and has now been corrected by the amendment to the specification contained herein.

In fact, Applicants submit that MASAKAZU's structure is distinctly different from the sensor structure illustrated in Applicants' Prior Art Figures 9-10. This distinction is evidenced, for example, by MASAKAZU's paragraph [0026], which is translated as follows:

"The structure described above allows that even if the weight member 6 (first movable electrode 7) is attracted to the first fixed electrode 9 by electrostatic attraction force

generated between the weight member 6 and the first glass substrate 2 (first fixed electrode 9) when anodically bonding the silicon substrate 1 and the first glass substrate 2, the weight member 6 (first movable electrode 7) gets in contact with the equipotential electrode 13. Then, since there is no potential difference between the first movable electrode 7 and the equipotential electrode 13, no current flows, making it possible to prevent the electrodes from being fusion-bonded to each other.”

Referring to MASAKAZU’s Figure 1, the fixed electrode 9 and the equipotential electrode 13 are not connected to each other (not equipotential) from the beginning, both before and after anodic bonding. When a high anodic voltage is applied between the substrates 1 and 2, it can cause the movable electrode 7 to be attracted to, and contact, the equipotential electrode 13 by an electrostatic attraction force. Since the movable electrode 7 and the equipotential electrode 13 are equipotential, they are prevented from being fusion-bonded to each other. The possible contact between the movable electrode 7 and the equipotential electrode 13 can prevent the movable electrode 7 from contacting the fixed electrode 9. However, discharge is likely to occur between the movable electrode 7 and the fixed electrode 9, which have potential differences therebetween. Thus, MASAKAKU fails to disclose the forming of an equipotential wiring to short-circuit a fixed electrode to a movable electrode, as claimed.

With regard to Applicants’ Figures 9 and 10, these figures illustrate the structure of a sensor in which all of the fixed electrode, the movable electrode, the bonding face-side surfaces of the insulating substrate and the semiconductor substrate, and the equipotential wiring 70 are placed inside the bonding area. However, since the equipotential wiring is kept formed and not cut, Figures 9 and 10 illustrated in Applicants’ specification fail to disclose Applicants’ method as recited in claims 1 and 5.

The Official Action acknowledges that MASAKAZU fails to disclose the feature of the claims relating to the cutting and removing of the equipotential wiring after the anodic bonding in which the equipotential wiring is cut by laser irradiation allowed to pass through from the insulating substrate. However, the Official Action asserts that KEICHI discloses this feature. It is noted that in making this assertion, the Official Action actually refers to Applicants' brief comments referring to KEICHI (JP Hei 6-340452) provided in Applicants' specification page 3, lines 19-25. Applicants' brief comments cited by the Official Action make a general statement that a short-circuit conductive pattern is cut, for example by a laser after anodic bonding. However, these comments do not provide any details regarding the location of the short-circuit pattern and specifically how the short-circuit pattern is cut. A closer review of KEICHI illustrates distinct differences between KEICHI and the features recited in Applicants' claims.

For instance, KEICHI discloses in Figures 1 and 2 that the fixed electrode output terminal lead 78 and the connection wiring 75, which serve as equipotential wiring, are exposed, i.e., are outside of the peripheral bonding areas of the glass member 80 (insulating substrate). Thus, KEICHI's sensor can not obtain air tightness in the sensor, such as the silicon structure 70 (movable semiconductor substrate) even if desired. The reason why the fixed electrode output terminal lead 78 and connection wiring 75 are exposed out of the bonding area is because KEICHI cuts the wiring 75 (equipotential wiring) by dicing. This distinction is evidenced in KEICHI's paragraph [0033] which is translated as follows:

“Further, although each of the above examples has described that the connection wiring 75 formed on the silicon structure 71 is cut by dicing after anodic bonding, it can also be trimmed using, for example, laser.”

Thus, KEICHI discloses dicing (which cannot be used in Applicants' claimed sensor in which all of the fixed electrode, the movable electrode, the bonding face-side surfaces of the insulating substrate and the semiconductor substrate, and the equipotential wiring are placed inside the bonding area) as the primary method of cutting the connection wiring 75. In the cited passage above, KEICHI suggests that trimming user a laser can also be used, instead of dicing, to trim the connection wiring. As a result, KEICHI only discloses the cutting or trimming of the connection wiring 75 outside the bonding area. KEICHI fails to disclose, teach, or suggest that all of the elements in the sensor be placed inside the bonding areas, (i.e., areas for anodic bonding) of the insulating substrate and the semiconductor substrate, so as to allow an irradiated laser to pass through from the insulating substrate in order to cut and remove the equipotential wiring inside the bonding area.

From the above discussion, it is submitted that Applicants' amended independent claims 1 and 5 would not have been obvious to one of ordinary skill in the art at the time of the invention in view of either the combination of MASAKAZU and KEICHI, or the combination of MASAKAZU and Applicants' admitted prior art, since both combinations fail to disclose the specific features recited in the claims. Thus, Applicants respectfully request that the rejection of independent method claims 1 and 5 under 35 U.S.C. § 103(a) be withdrawn.

Pending independent claim 9, and dependent claims 4 and 8, were rejected under 35 U.S.C. §103(a) over MASAKAZU in view of KEICHI, and further in view of KATSUMI. Independent sensor claim 9 recites features similar to those discussed above with regard to independent method claims 1 and 5. Applicants submit that KATSUMI fails to remedy the deficiencies of MASAKAZU and KEICHI discussed above. Thus, Applicants submit that

independent claim 9 is patentable for at least the reasons discussed above with regard to claims 1 and 5.

Claims 4 and 8 depend on independent method claims 1 and 5, respectively, and are patentable for at least the reasons discussed above with regard to claims 1 and 5, and further for the additional features recited therein. For instance, claims 4 and 8 recite that the equipotential wiring has a reduced wiring width at a cutting location thereof. The Final Official action acknowledges that the combination of MASAKAZU and KEICHI fails to disclose this feature. However, the Final Official Action asserts that KATSUMI teaches discloses this feature, citing KATSUMI's paragraphs [0043]-[0044] and Figure 9A.

KATSUMI's Figure 9A discloses an electrically conductive pattern 23" extended from the lead 22 of the fixed electrode 21, which is designed to have a width W2 smaller than a width W1 of the lead 22 so as to allow the conductive pattern 23" to be securely fused and cut by the application of electric current. The portion of the equipotential wiring with the increased resistance is more likely to cause discharge in anodic bonding due to insufficient equipotentiality, which contradicts the main purpose of equipotential wiring. In contrast, Applicants claimed methods use laser irradiation, which is allowed to pass through from the insulating substrate, making it unnecessary to provide a portion of the equipotential wiring with an increased resistance which may cause discharge in anodic bonding. Thus, KATSUMI fails to disclose an equipotential wiring having a reduced wiring width at a cutting location that is cut by laser irradiation that passes through the insulating substrate, as recited by the claims.

From the above discussion, it is evident that Applicants' amended independent claim 9, and dependent claims 4 and 8, would not have been obvious to one of ordinary skill in the art at the time of the invention in view of either the combination of MASAKAZU, KEICHI, and

KATSUMI since both combinations fail to disclose the specific features recited in the claims.

Thus, Applicants respectfully request that the rejection of pending claims 4, 8, and 9 under 35 U.S.C. § 103(a) be withdrawn.

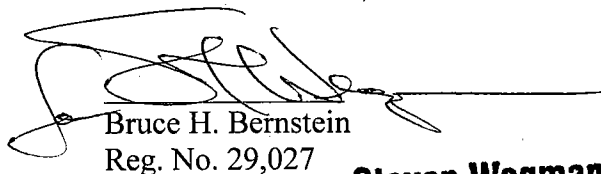
SUMMARY

From the amendments, arguments, and remarks provided above, Applicants submit that all of the pending claims in the present application are patentable over the references cited by the Examiner, either alone or in combination. Accordingly, reconsideration of the outstanding Final Official Action is respectfully requested and an indication of the allowance of claims 1, 4-5, and 8-9 is now believed to be appropriate.

Applicants note that this amendment is being made to advance prosecution of the application to allowance, and should not be considered as surrendering equivalents of the territory between the claims prior to the present amendment and the amended claims. Further, no acquiescence as to the propriety of the Examiner's rejections is made by the present amendment. All other amendments to the claims which have been made in this amendment, and which have not been specifically noted to overcome a rejection based upon the prior art, should be considered to have been made for a purpose unrelated to patentability, and no estoppel should be deemed to attach thereto.

Should there be any questions, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Respectfully Submitted,
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